DRINKING WATER SURVEILLANCE PROGRAM

KENORA WATER TREATMENT PLANT

ANNUAL REPORT 1990

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

KENORA WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Kenora water treatment plant is a conventional treatment plant which treats water from the Lake of the Woods. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, fluoridation, corrosion control, and disinfection. This plant has a rated capacity of 22.0 x 1000 m^3/day. The Kenora water treatment plant serves a population of approximately 16,000.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

The health related guideline for lead was exceeded in one sample. The District Officer was notified. Inadequate flushing may have contributed to the elevated lead level.

The Kenora water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

The detection of elevated lead and copper levels in the distribution system standing samples indicate that household taps should be flushed before water is used for consumption.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	SITE RAW POSITIVE	SITE RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE
BACTERIOLOGICAL	13	4	30	8	1	12	9	1	11
CHEMISTRY (FLD)	36	36	100	72	72	100	75	75	100
CHEMISTRY (LAB)	252	209	82	236	177	75	360	321	89
METALS	288	67	23	288	73	25	460	167	36
CHLOROAROMATICS	126	0	0	168	0	0	140	0	0
CHLOROPHENOLS	6	0	0	6	0	0	.	.	.
PAH	168	0	0	185	0	0	17	0	0
PESTICIDES & PCB	333	0	0	410	1	0	213	1	0
PHENOLICS	11	2	18	12	2	16	.	.	.
SPECIFIC PESTICIDES	35	0	0	38	0	0	10	0	0
VOLATILES	319	22	6	348	38	10	290	31	10
TOTAL	1587	340		1771	364		1574	596	

DRINKING WATER SURVEILLANCE PROGRAM

KENORA WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Kenora water treatment plant in December 1988. A previous annual report was published for 1989.

PLANT DESCRIPTION

The Kenora water treatment plant is a conventional treatment plant which treats water from Lake of the Woods. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, fluoridation, corrosion control, and disinfection. This plant has a rated capacity of 22.0 x 1000 m^3/day. The Kenora water treatment plant serves a population of approximately 16,000.

The sample day flows ranged from 9.0 x 1000 m^3/day to 14.3 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher

temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 5 of 18 treated and distributed water samples with a maximum reported value of 24.0°C.

CHEMISTRY (LAB)

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

The laboratory turbidity exceeded the Maximum Acceptable Concentration in 4 of 12 treated water samples with a maximum reported value of 3.7 FTU but these values were not confirmed by the field turbidity results which were considered to be more reliable.

METALS

Lead exceeded the ODWO Maximum Acceptable Concentration of 10.0 ug/L in 1 of 10 distribution water samples with a reported value of 19.0 ug/L. The District Officer was notified.

It should be noted that results for a majority of the standing samples taken at the distribution system site reported elevated lead values to a maximum of 78.0 ug/L. Inadequate flushing may have contributed to elevated lead levels in the free flow sample.

Copper levels in a number of the distribution system standing samples was also high with a reported maximum value of 3,658 ug/L.

These elevated metal concentrations in the standing water sample indicate that the household taps should be flushed before the water is used for consumption.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was found at positive levels in 2 of 6 treated and distributed water samples with a maximum reported value of 350 ng/L. The United States Environmental Protection Agency has an Ambient Water Quality Criteria of 206,000 ng/L.

The results of the other parameters in the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan shows that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

1,1,1-Trichloroethane was reported at positive levels in 2 of 22 treated and distributed samples with a maximum reported value of 0.64 ug/L. This is below the United States Environmental Protection Agency Maximum Contaminant Level for 1,1,1-trichloroethane of 200 ug/L.

Toluene was found at positive levels in 2 of the 22 treated and distributed water samples. The maximum observed level was 0.8 ug/L. This was below the ODWO Aesthetic Objective of 24 ug/L.

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Only total THMs results are discussed.

Total THMs were found at positive levels in 22 treated and distributed water samples with a maximum level of 174.5 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

THMs were also reported in all raw water samples indicating mixing of chlorine with raw water prior to the sample location. Since DWSP requires a sample which represents the raw water source before the addition of any chemicals, a review of the present raw water sample location is required.

CONCLUSIONS

The Kenora water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

The health related guideline for lead was exceeded in one sample. The District Officer was notified. Inadequate flushing may have contributed to the elevated lead level.

The detection of elevated lead and copper levels in the distribution system standing samples indicate that household taps should be flushed before the water is used for consumption.

The presence of elevated metals in the distribution system samples indicate that a review of the corrosion control process should be conducted.

The presence of THMs in raw water indicate that a review of the raw water sample location is required.

FIGURE 1

KENORA WTP

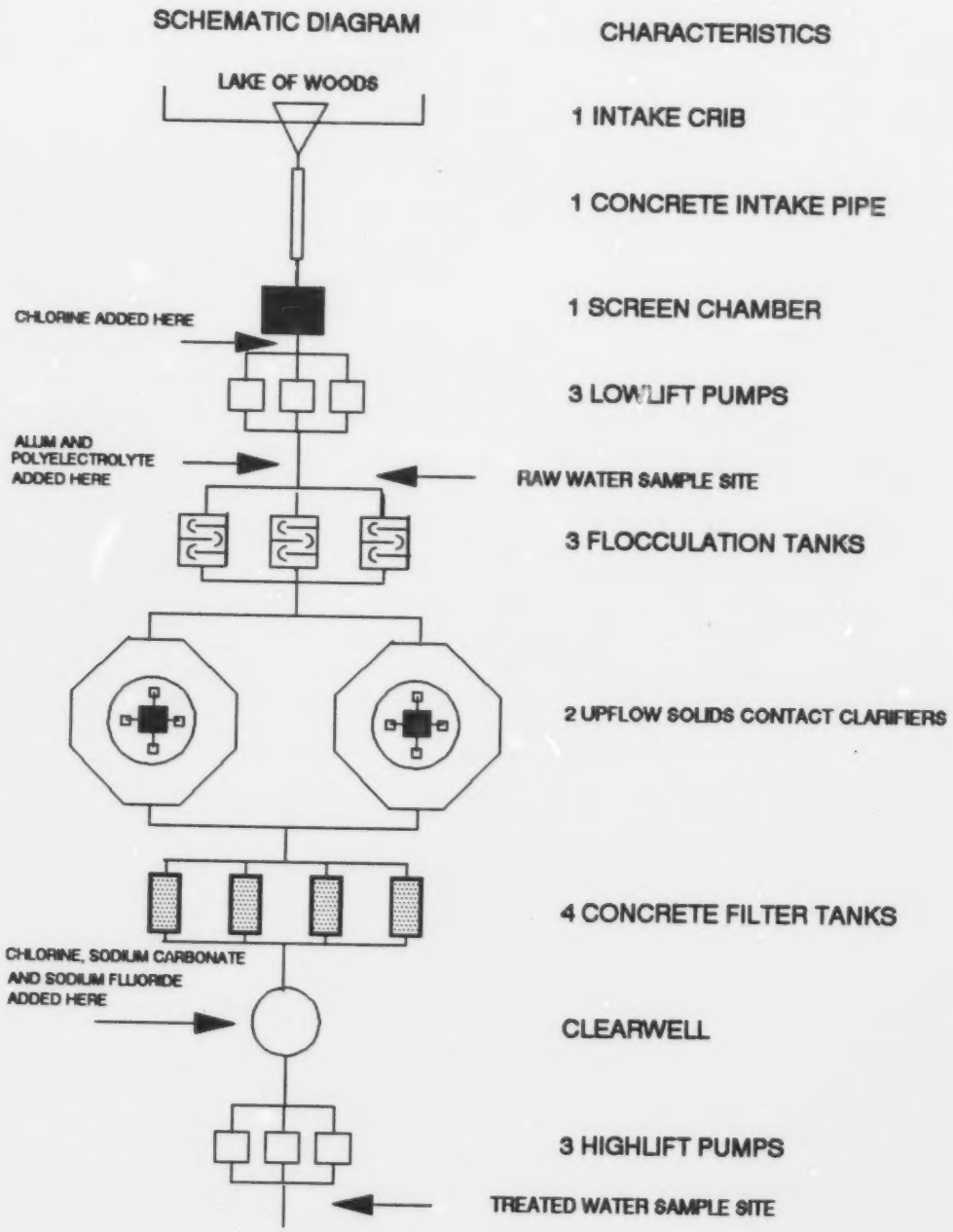

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #:	220001423
PLANT NAME:	KENORA WTP
DISTRICT:	KENORA
REGION:	NORTHWEST
DISTRICT OFFICER:	P. FOX
UTM #:	153902605510310
PLANT SUPERINTENDENT:	ED REYNARD
ADDRESS:	9 SEVENTH ST. S. KENORA, ONTARIO P9N 1P3 (807)468-7556
MUNICIPALITY:	TOWN OF KENORA
AUTHORITY:	MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	26.000	(X 1000 M3/DAY)
RATED CAPACITY:	22.000	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
JAFFREY-MALLICK	3,500
KEEWATIN	2,500
KENORA	10,000

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
ALKALINITY	AFTER CLARIFIERS	MONTHLY
	PLANT EFFLUENT	MONTHLY
	RAW WATER	MONTHLY
ALUMINUM	PLANT EFFLUENT	MONTHLY
FREE CHLORINE RESIDUAL	AFTER CLARIFIERS	DAILY
	AFTER FILTERS	DAILY
	CHLORINE EFFLUENT	CONTINUOUS
	RAW WATER IN LAB	R DIAL
	PLANT EFFLUENT	CONTINUOUS
COLOUR	AFTER CLARIFIERS	MONTHLY
	PLANT EFFLUENT	DAILY
	RAW WATER	MONTHLY
FLUORIDE	PLANT EFFLUENT	DAILY
HARDNESS	AFTER CLARIFIERS	MONTHLY
	PLANT EFFLUENT	MONTHLY
	RAW WATER	MONTHLY
PH	AFTER CLARIFIERS	MONTHLY
	TREATED WATER IN LAB	DAILY
	CHLORINE EFFLUENT	CONTINUOUS
	RAW WATER IN LAB	MONTHLY
TEMPERATURE	RAW WATER	CONTINUOUS
TURBIDITY	AFTER CLARIFIERS	MONTHLY
	RAW WATER	MONTHLY
	TREATED WATER	DAILY

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)					
			PRE CHLORINATION	COAGULATION	COAGULATION AID	FLUORIDATION	POST CHLORINATION	CORROSION CONTROL
DATE	DELAY * TIME(HRS)	FLOW (1000M3)	CHLORINE	ALUM LIQUID	POLYELECTROLYTE	SODIUM FLUORIDE	CHLORINE	SODIUM CARBONATE
JAN 22	6.00	12.300	2.39	48.67	.52	.44	.53	25.94
FEB 27	.60	14.300	2.54	50.20	.54	1.04	.64	22.22
MAR 27	6.00	13.500	1.72	50.03	.60	.70	.84	19.18
APR 24	6.00	12.900	1.99	49.74	.59	.76	.66	24.64
MAY 29	6.00	13.900	2.15	53.10	.62	.88	.92	27.76
JUN 26	6.00	11.600	3.34	44.73	.62	.76	1.67	25.44
JUL 23	6.00	12.300	3.88	44.05	.60	.82	1.67	
AUG 30	6.00	12.500	3.26	44.07	.59	.83	1.75	23.61
SEP 25	6.00	10.900	3.79	43.63	.59	.75	1.63	20.82
OCT 23	6.00	9.000	3.74	41.42	.57	.85	1.25	20.18
NOV 26	6.00	9.900	2.54	44.37	.52	.74	1.10	16.05
DEC 10	6.00	10.400	2.63	45.73	.56	.74	.87	19.64

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL									
FECAL COLIFORM MF	5	0	0	.	.	.	.	.	.
FECAL COLIFORM	.	.	.	2	0	0	2	0	0
STANDRD PLATE CNT MF	.	.	.	4	1	0	5	1	0
COLIFORM	.	.	.	2	0	0	2	0	0
TOTAL COLIFORM MF	5	1	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	3	3	0	.	.	.	.	.	.
*TOTAL SCAN BACTERIOLOGICAL	13	4	0	8	1	0	9	1	0
*TOTAL GROUP BACTERIOLOGICAL	13	4	0	8	1	0	9	1	0
CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	12	12	0	15	15	0
FLD CHLORINE FREE	.	.	.	12	12	0	15	15	0
FLD CHLORINE (TOTAL)	.	.	.	12	12	0	15	15	0
FLD PH	12	12	0	12	12	0	15	15	0
FLD TEMPERATURE	12	12	0	12	12	0	15	15	0
FLD TURBIDITY	12	12	0	12	12	0	.	.	.
*TOTAL SCAN CHEMISTRY (FLD)	36	36	0	72	72	0	75	75	0
CHEMISTRY (LAB)									
ALKALINITY	12	12	0	11	11	0	20	20	0
CALCIUM	12	12	0	11	11	0	20	20	0
CYANIDE	12	0	0	12	0	0	.	.	.
CHLORIDE	12	12	0	11	11	0	20	20	0
COLOUR	12	11	1	11	11	0	20	14	3
CONDUCTIVITY	12	12	0	11	11	0	20	20	0
DISS ORG CARBON	12	12	0	11	11	0	20	20	0
FLUORIDE	12	12	0	11	11	0	20	20	0
HARDNESS	12	12	0	11	11	0	20	20	0
IONCAL	12	12	0	12	11	0	20	20	0
LANGELIERS INDEX	0	0	0	0	0	0	0	0	0
MAGNESIUM	12	12	0	11	11	0	20	20	0
SODIUM	12	11	1	11	11	0	20	20	0
AMMONIUM TOTAL	12	7	2	11	1	5	20	13	4
NITRITE	12	2	10	11	2	8	20	4	16
TOTAL NITRATES	12	6	5	11	7	3	20	11	7
NITROGEN TOT KJELD	12	12	0	12	12	0	20	20	0
PH	12	12	0	11	11	0	20	20	0
PHOSPHORUS FIL REACT	12	4	7	11	0	4	.	.	.
PHOSPHORUS TOTAL	12	12	0	12	1	8	.	.	.
SULPHATE	12	12	0	11	11	0	20	20	0
TURBIDITY	12	12	0	12	11	1	20	19	1
*TOTAL SCAN CHEMISTRY (LAB)	252	209	26	236	177	29	360	321	31

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS									
SILVER	12	0	0	12	0	0	20	0	0
ALUMINUM	12	12	0	12	12	0	20	20	0
ARSENIC	12	0	12	12	0	12	20	0	17
BARIUM	12	12	0	12	12	0	20	20	0
BORON	12	1	11	12	1	11	20	3	17
BERYLLIUM	12	0	0	12	0	0	20	0	0
CADMIUM	12	0	0	12	0	0	20	0	2
COBALT	12	0	12	12	0	12	20	0	19
CHROMIUM	12	0	7	12	0	5	20	0	15
COPPER	12	0	12	12	1	11	20	20	0
IRON	12	0	12	12	0	12	20	0	20
MERCURY	12	0	3	12	0	3	.	.	.
MANGANESE	12	12	0	12	12	0	20	20	0
MOLYBDENUM	12	0	12	12	0	12	20	0	20
NICKEL	12	0	10	12	0	12	20	6	13
LEAD	12	1	10	12	6	6	20	20	0
ANTIMONY	12	3	9	12	2	10	20	10	10
SELENIUM	12	0	1	12	0	0	20	0	1
STRONTIUM	12	12	0	12	12	0	20	20	0
TITANIUM	12	3	9	12	3	9	20	8	12
THALLIUM	12	0	0	12	0	0	20	0	0
URANIUM	12	0	5	12	0	0	20	0	0
VANADIUM	12	1	11	12	0	11	20	0	19
ZINC	12	10	2	12	12	0	20	20	0
*TOTAL SCAN METALS	288	67	138	288	73	126	460	167	165
*TOTAL GROUP INORGANIC & PHYSICAL	576	312	164	596	322	155	895	563	196
CHLOROAROMATICS									
HEXACHLOROBUTADIENE	9	0	0	12	0	0	10	0	0
123 TRICHLOROBENZENE	9	0	0	12	0	0	10	0	0
1234 T-CHLOROBENZENE	9	0	0	12	0	0	10	0	0
1235 T-CHLOROBENZENE	9	0	0	12	0	0	10	0	0
124 TRICHLOROBENZENE	9	0	0	12	0	0	10	0	0
1245 T-CHLOROBENZENE	9	0	0	12	0	0	10	0	0
135 TRICHLOROBENZENE	9	0	0	12	0	0	10	0	0
HCB	9	0	0	12	0	0	10	0	0
HEXACHLOROETHANE	9	0	0	12	0	0	10	0	0
OCTACHLOROSTYRENE	9	0	0	12	0	0	10	0	0
PENTACHLOROBENZENE	9	0	0	12	0	0	10	0	0
236 TRICHLOROTOLUENE	9	0	0	12	0	0	10	0	0
245 TRICHLOROTOLUENE	9	0	0	12	0	0	10	0	0
26A TRICHLOROTOLUENE	9	0	0	12	0	0	10	0	0
*TOTAL SCAN CHLOROAROMATICS	126	0	0	168	0	0	140	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS									
234 TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.
2345 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.
2356 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.
245-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.
246-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.
PENTACHLOROPHENOL	1	0	0	1	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	6	0	0	6	0	0	0	0	0
PAH									
PHENANTHRENE	10	0	0	11	0	0	1	0	0
ANTHRACENE	9	0	0	10	0	0	1	0	0
FLUORANTHENE	10	0	0	11	0	0	1	0	0
PYRENE	10	0	0	11	0	0	1	0	0
BENZO(A)ANTHRACENE	10	0	0	11	0	0	1	0	0
CHRYSENE	10	0	0	11	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	9	0	0	10	0	0	1	0	0
BENZO(E) PYRENE	10	0	0	11	0	0	1	0	0
BENZO(B) FLUORANTHEN	10	0	0	11	0	0	1	0	0
PERYLENE	10	0	0	11	0	0	1	0	0
BENZO(K) FLUORANTHEN	10	0	0	11	0	0	1	0	0
BENZO(A) PYRENE	10	0	0	11	0	0	1	0	0
BENZO(G,H,I) PERYLEN	10	0	0	11	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	10	0	0	11	0	0	1	0	0
INDENO(1,2,3-C,D) PY	10	0	0	11	0	0	1	0	0
BENZO(B) CHRYSENE	10	0	0	11	0	0	1	0	0
CORONENE	10	0	0	11	0	0	1	0	0
*TOTAL SCAN PAH	168	0	0	185	0	0	17	0	0
PESTICIDES & PCB									
ALDRIN	9	0	0	12	0	0	10	0	0
ALPHA BHC	9	0	1	12	0	2	10	0	3
BETA BHC	9	0	0	12	0	0	10	0	0
LINDANE	9	0	0	12	0	0	10	0	0
ALPHA CHLORDANE	9	0	0	12	0	0	10	0	0
GAMMA CHLORDANE	9	0	0	12	0	0	10	0	0
DIELDRIN	9	0	0	12	0	0	10	0	0
METHOXYCHLOR	9	0	0	12	0	0	10	0	0
ENDOSULFAN 1	9	0	0	12	0	0	10	0	0
ENDOSULFAN II	9	0	0	12	0	0	10	0	0
ENDRIN	9	0	0	12	0	0	10	0	0
ENDOSULFAN SULPHATE	9	0	0	12	0	0	10	0	0
HEPTACHLOR EPOXIDE	9	0	0	12	0	0	10	0	0
HEPTACHLOR	9	0	0	12	0	0	10	0	0
MIREX	9	0	0	12	0	0	10	0	0
OXYCHLORDANE	9	0	0	12	0	0	10	0	0
OPDDT	9	0	0	12	0	0	10	0	0
PCB	9	0	0	12	0	0	10	0	0
DDD	9	0	0	12	0	0	10	0	0
PPDDE	9	0	0	12	0	0	10	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	9	0	0	12	0	0	10	0	0
AMETRINE	11	0	0	12	0	0	.	.	.
ATRAZINE	11	0	0	12	0	0	.	.	.
ATRATONE	11	0	0	12	0	0	.	.	.
CYANAZINE (BLADEX)	11	0	0	12	0	0	.	.	.
DESETHYLATRAZINE	11	0	0	12	0	0	.	.	.
D-ETHYL SIMAZINE	11	0	0	12	0	0	.	.	.
PROMETONE	11	0	0	12	0	0	.	.	.
PROPAZINE	11	0	0	12	0	0	.	.	.
PROMETRYNE	11	0	0	12	0	0	.	.	.
METRIBUZIN (SENCOR)	10	0	0	11	0	0	.	.	.
SIMAZINE	11	0	0	12	0	0	.	.	.
ALACHLOR (LASSO)	11	0	0	12	0	0	.	.	.
METOLACHLOR	11	0	0	12	0	0	.	.	.
HEXACLCYCLOPENTADIEN	2	0	0	3	1	0	3	1	0
*TOTAL SCAN PESTICIDES & PCB	333	0	1	410	1	2	213	1	3
PHENOLICS									
PHENOLICS	11	2	4	12	2	8	.	.	.
*TOTAL SCAN PHENOLICS	11	2	4	12	2	8	0	0	0
SPECIFIC PESTICIDES									
TOXAPHENE	9	0	0	12	0	0	10	0	0
2,4,5-T	1	0	0	1	0	0	.	.	.
2,4-D	1	0	0	1	0	0	.	.	.
2,4-DB	1	0	0	1	0	0	.	.	.
2,4 D PROPIONIC ACID	1	0	0	1	0	0	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	1	0	0	1	0	0	.	.	.
DIAZINON	1	0	0	1	0	0	.	.	.
DICHLOROVOS	1	0	0	1	0	0	.	.	.
CHLORPYRIFOS	1	0	0	1	0	0	.	.	.
ETHION	1	0	0	1	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	1	0	0	1	0	0	.	.	.
MEVINPHOS	1	0	0	1	0	0	.	.	.
METHYL PARATHION	1	0	0	1	0	0	.	.	.
METHYLTRITHION	1	0	0	1	0	0	.	.	.
PARATHION	1	0	0	1	0	0	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.
RELDAN	1	0	0	1	0	0	.	.	.
RONNEL	1	0	0	1	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.
BUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	1	0	0	1	0	0	.	.	.
CICP	1	0	0	1	0	0	.	.	.
DIALLATE	1	0	0	1	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAN	1	0	0	1	0	0	.	.	.
IPC	1	0	0	1	0	0	.	.	.
PROPOXUR	1	0	0	1	0	0	.	.	.
CARBARYL	1	0	0	1	0	0	.	.	.
BUTYLATE	1	0	0	1	0	0	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	35	0	0	38	0	0	10	0	0
VOLATILES									
BENZENE	11	0	1	12	0	5	10	0	2
TOLUENE	11	0	0	12	1	8	10	0	4
ETHYLBENZENE	11	0	2	12	0	10	10	0	3
P-XYLENE	11	0	0	12	0	0	10	0	0
M-XYLENE	11	0	0	12	0	5	10	0	0
O-XYLENE	11	0	0	12	0	5	10	0	0
STYRENE	11	0	2	12	0	9	10	0	3
1,1 DICHLOROETHYLENE	11	0	0	12	0	0	10	0	0
METHYLENE CHLORIDE	11	0	0	12	0	0	10	0	0
T1,2DICHLOROETHYLENE	11	0	0	12	0	0	10	0	0
1,1 DICHLOROETHANE	11	0	0	12	0	0	10	0	0
CHLOROFORM	11	11	0	12	12	0	10	10	0
111, TRICHLOROETHANE	11	1	3	12	1	1	10	1	0
1,2 DICHLOROETHANE	11	0	0	12	0	0	10	0	0
CARBON TETRACHLORIDE	11	0	0	12	0	0	10	0	0
1,2 DICHLOROPROPANE	11	0	0	12	0	0	10	0	0
TRICHLOROETHYLENE	11	0	0	12	0	0	10	0	0
DICHLOROBROMOMETHANE	11	3	8	12	12	0	10	10	0
112 TRICHLOROETHANE	11	0	0	12	0	0	10	0	0
CHLORODIBROMOMETHANE	11	0	0	12	0	0	10	0	0
T-CHLOROETHYLENE	11	0	0	12	0	0	10	0	0
BROMOFORM	11	0	0	12	0	0	10	0	0
1122 T-CHLOROETHANE	11	0	0	12	0	0	10	0	0
CHLOROBENZENE	11	0	0	12	0	0	10	0	0
1,4 DICHLOROBENZENE	11	0	0	12	0	0	10	0	0
1,3 DICHLOROBENZENE	11	0	0	12	0	0	10	0	0
1,2 DICHLOROBENZENE	11	0	0	12	0	0	10	0	0
ETHLYENE DIBROMIDE	11	0	0	12	0	0	10	0	0
TOTL TRIHALOMETHANES	11	7	4	12	12	0	10	10	0
*TOTAL SCAN VOLATILES	319	22	20	348	38	43	290	31	12
*TOTAL GROUP ORGANIC	998	24	25	1167	41	53	670	32	15

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

-	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
ICS	No Data: Contamination Suspected
IIL	No Data: Sample Incorrectly Labelled
IIS	No Data: Insufficient Sample
IIV	No Data: Inverted Septum
ILA	No Data: Laboratory Accident
ILD	No Data: Test Queued After Sample Discarded
INA	No Data: No Authorization To Perform Reanalysis
INP	No Data: No Procedure
INR	No Data: Sample Not Received
IOP	No Data: Obscured Plate
IQU	No Data: Quality Control Unacceptable
IPE	No Data: Procedural Error - Sample Discarded
IPH	No Data: Sample pH Outside Valid Range
IRE	No Data: Received Empty
IRO	No Data: See Attached Report (no numeric results)
ISM	No Data: Sample Missing
ISS	No Data: Send Separate Sample Properly Preserved
IUI	No Data: Indeterminant Interference
ITX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(TO6)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 0 (A1)	
MAR	BDL	.	.	.
JUN	BDL	.	.	.
JUL	0	.	.	.
NOV	0	.	.	.
DEC	BDL	.	.	.
FECAL COLIFORM (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 0 (A1)	
NOV	.	0	.	0
DEC	.	0	0	.
STANDRD PLATE CNT MF (COUNT/ML)		DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)	
MAR	.	3 <=>	4 <=>	.
JUN	.	1 <=>	8 <=>	.
JUL	.	134	.	.
SEP	.	.	7 <=>	.
NOV	.	0	.	0
DEC	.	.	1	.
COLIFORM (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = N/A	
NOV	.	0	.	0
DEC	.	0	0	.
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)	
MAR	BDL	.	.	.
JUN	BDL	.	.	.
JUL	38	.	.	.
NOV	0	.	.	.
DEC	BDL	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = N/A	
MAR	308	.	.	.
JUN	4800 >	.	.	.
JUL	4800 >	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A	
JAN	.	.250	.	.
FEB	.	.060	.250	.
MAR	.	.280	.200	.200
APR	.	.240	.200	.200
MAY	.	.190	.200	.200
JUN	.	.120	.100	.
JUL	.	.470	.	.
AUG	.	.300	.200	.200
SEP	.	.350	.200	.
OCT	.	.430	.200	.200
NOV	.	.200	.150	.
DEC	.	.320	.	.200
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A	
JAN	.	.540	.	.
FEB	.	.570	.100	.
MAR	.	.470	.300	.300
APR	.	.430	.100	.100
MAY	.	.470	.100	.100
JUN	.	.460	.200	.
JUL	.	.560	.	.
AUG	.	.610	.100	.150
SEP	.	.790	.100	.
OCT	.	.690	.300	.300
NOV	.	.650	.150	.
DEC	.	.560	.	.100
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A	
JAN	.	.790	.	.
FEB	.	.630	.350	.
MAR	.	.750	.500	.500
APR	.	.670	.300	.300
MAY	.	.660	.300	.300
JUN	.	.680	.300	.
JUL	.	1.030	.	.
AUG	.	.910	.300	.350
SEP	.	1.140	.300	.
OCT	.	1.120	.500	.500
NOV	.	.850	.300	.
DEC	.	.880	.	.300
FLD PH (DMNSLESS)		DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)	
JAN	7.340	7.030	.	.
FEB	7.480	7.070	7.250	.
MAR	7.460	7.090	7.100	7.100
APR	7.420	7.160	7.300	7.300
MAY	7.840	7.270	7.200	7.200
JUN	7.360	7.240	7.100	.
JUL	7.360	7.150	.	.
AUG	7.430	7.050	7.000	7.000
SEP	7.450	7.170	7.100	.
OCT	7.530	7.190	6.900	6.900
NOV	7.500	7.230	7.200	.
DEC	7.530	7.380	.	7.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)	
JAN	2.000	2.000	.	.	.
FEB	2.000	2.000	3.000	.	.
MAR	3.000	3.000	3.000	3.000	.
APR	5.000	5.000	5.000	5.000	.
MAY	12.000	12.000	9.000	9.000	.
JUN	19.500	19.500	15.000	.	.
JUL	23.500	23.500	.	.	.
AUG	24.000	24.000	22.000	20.000	.
SEP	17.000	17.000	17.500	.	.
OCT	10.000	10.000	11.000	11.000	.
NOV	3.000	3.000	3.500	.	.
DEC	2.500	2.500	.	3.000	.
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)	
JAN	.400	.080	.	.	.
FEB	.600	.070	.	.	.
MAR	.700	.080	.	.	.
APR	1.200	.080	.	.	.
MAY	1.600	.090	.	.	.
JUN	.900	.070	.	.	.
JUL	.700	.070	.	.	.
AUG	.800	.070	.	.	.
SEP	1.500	.090	.	.	.
OCT	1.310	.080	.	.	.
NOV	.600	.060	.	.	.
DEC	.400	.110	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A3)
JAN	46.600	45.000	.	.
FEB	50.400	46.000	46.800	51.700
MAR	49.600	44.100	49.900	45.500
APR	48.900	ILA	50.100	45.300
MAY	49.000	44.500	51.200	48.900
JUN	48.200	49.500	53.700	49.900
JUL	49.300	46.600	.	.
AUG	49.300	43.700	48.300	46.200
SEP	48.800	45.100	47.200	44.900
OCT	50.200	42.900	46.200	45.800
NOV	50.800	47.700	48.100	45.600
DEC	53.000	46.600	49.600	49.500
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)
JAN	13.700	13.700	.	.
FEB	14.800	14.900	14.400	15.600
MAR	15.400	15.400	15.600	15.000
APR	15.200	ILA	15.600	15.200
MAY	14.300	14.700	14.600	14.000
JUN	15.400	15.200	15.400	15.200
JUL	14.600	14.000	.	.
AUG	13.400	13.600	14.000	12.600
SEP	15.200	15.400	15.200	15.600
OCT	14.200	14.300	14.100	14.400
NOV	14.800	15.500	15.500	15.500
DEC	17.200	17.200	17.800	17.200
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)
JAN	3.200	5.200	.	.
FEB	3.100	5.300	5.200	5.400
MAR	3.300	5.100	5.300	5.100
APR	3.100	ILA	5.300	5.000
MAY	3.300	5.400	5.500	5.500
JUN	3.200	7.500	7.900	6.500
JUL	4.800	7.200	.	.
AUG	2.700	6.800	6.900	6.900
SEP	3.100	6.500	6.600	6.900
OCT	3.200	6.200	6.900	6.600
NOV	3.000	5.500	5.500	5.600
DEC	3.100	4.900	5.300	4.900
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)
JAN	18.500	2.500	.	.
FEB	20.500	3.500	4.000	BDL
MAR	21.500	3.500	BDL	3.000
APR	21.000	ILA	BDL	3.000
MAY	20.500	3.000	2.500	3.000
JUN	18.000	3.000	.500 <T	3.000
JUL	19.500	3.500	.	.
AUG	.500 <T	3.000	31.500	2.500
SEP	18.500	3.500	2.500	3.000
OCT	14.500	3.000	3.000	3.500
NOV	20.000	3.500	2.000 <T	3.500
DEC	19.000	3.000	2.000 <T	3.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CONDUCTIVITY (UMHO/CM)			**DET'N LIMIT = 1.**	**GUIDELINE = 400 (F2)**
JAN	118	179	.	.
FEB	117	179	180	183
MAR	120	176	182	179
APR	117	ILA	180	176
MAY	115	175	180	181
JUN	115	182	188	184
JUL	117	180	.	.
AUG	118	173	180	179
SEP	120	175	177	175
OCT	122	171	177	180
NOV	121	176	175	173
DEC	127	180	182	180
DISS ORG CARBON (MG/L)			**DET'N LIMIT = .100**	**GUIDELINE = 5.0 (A3)**
JAN	8.700	4.300	.	.
FEB	8.300	3.900	3.900	3.400
MAR	8.500	4.100	3.500	4.000
APR	8.300	ILA	3.400	3.900
MAY	8.400	4.300	3.800	4.100
JUN	8.200	4.400	3.900	4.300
JUL	8.300	4.500	.	.
AUG	8.300	4.500	3.800	4.300
SEP	8.600	4.900	4.500	4.600
OCT	8.600	4.800	4.600	4.600
NOV	8.400	4.600	4.300	4.400
DEC	8.200	4.300	4.200	4.300
FLUORIDE (MG/L)			**DET'N LIMIT = 0.01**	**GUIDELINE = 1.5 (A1)**
JAN	.060	.800	.	.
FEB	.060	.780	.760	.760
MAR	.060	.860	.900	.900
APR	.060	ILA	.900	.880
MAY	.060	.920	.940	.960
JUN	.060	.900	.980	.940
JUL	.060	.920	.	.
AUG	.060	.960	.940	.900
SEP	.060	.820	.880	.900
OCT	.060	.900	.920	.920
NOV	.080	.900	.920	.920
DEC	.060	.960	.980	.960
HARDNESS (MG/L)			**DET'N LIMIT = 0.5**	**GUIDELINE = 80-100 (A4)**
JAN	52.300	52.400	.	.
FEB	55.900	55.600	54.300	57.800
MAR	57.000	57.000	58.000	56.000
APR	58.000	ILA	58.000	57.000
MAY	53.600	55.100	54.700	53.000
JUN	57.000	56.000	56.000	56.000
JUL	55.000	53.000	.	.
AUG	52.000	53.000	54.000	50.000
SEP	58.000	58.000	58.000	58.000
OCT	55.100	54.900	55.400	55.500
NOV	57.100	59.000	59.000	59.200
DEC	64.000	63.000	65.000	63.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A	
JAN	5.775	6.528	.	.	.
FEB	4.235	3.700	1.638	.197	.
MAR	5.990	6.224	1.827	4.992	.
APR	8.463	.000	.836	5.251	.
MAY	2.645	4.254	.502	1.145	.
JUN	10.260	2.838	1.386	4.912	.
JUL	.034	1.383	.	.	.
AUG	3.540	3.484	.520	2.261	.
SEP	9.123	6.071	2.475	5.992	.
OCT	1.712	2.623	2.007	.276	.
NOV	4.924	5.018	3.975	7.085	.
DEC	12.600	10.310	9.122	7.431	.
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A	
JAN	-.620	-.662	.	.	.
FEB	-.702	-.706	-1.044	-.997	.
MAR	-.593	-.689	-.922	-.868	.
APR	-.654	.	-.899	-.753	.
MAY	-.769	-.995	-.809	-.867	.
JUN	-.544	-.576	-.618	-.594	.
JUL	-.568	-.808	.	.	.
AUG	-.856	-.875	-1.032	-1.077	.
SEP	-.586	-.779	-.995	-.885	.
OCT	-.574	-.881	-.847	-.803	.
NOV	-.531	-.602	-.868	-.850	.
DEC	-.460	-.768	-.877	-.772	.
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 30 (F2)	
JAN	4.400	4.450	.	.	.
FEB	4.600	4.500	4.500	4.550	.
MAR	4.400	4.400	4.600	4.500	.
APR	4.700	ILA	4.700	4.700	.
MAY	4.350	4.500	4.450	4.400	.
JUN	4.500	4.300	4.400	4.300	.
JUL	4.500	4.400	.	.	.
AUG	4.600	4.700	4.700	4.500	.
SEP	4.700	4.700	4.700	4.700	.
OCT	4.800	4.650	4.900	4.750	.
NOV	4.900	4.950	4.900	4.950	.
DEC	5.000	4.900	5.000	4.900	.
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)	
JAN	1.000 <T	12.000	.	.	.
FEB	3.200	14.500	14.500	14.700	.
MAR	2.800	12.800	13.200	13.800	.
APR	3.000	ILA	13.600	13.600	.
MAY	2.900	13.800	15.100	15.500	.
JUN	3.200	15.400	16.600	15.800	.
JUL	2.600	14.000	.	.	.
AUG	3.200	13.000	14.000	14.000	.
SEP	2.600	12.000	12.000	12.200	.
OCT	2.900	10.800	11.400	11.700	.
NOV	2.700	12.100	12.200	11.800	.
DEC	3.200	12.600	12.800	12.800	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)
JAN	.004 <T	BDL	.	.
FEB	BDL	BDL	.010	.004 <T
MAR	BDL	BDL	.010	BDL
APR	.016	ILA	.014	BDL
MAY	.066	BDL	.002 <T	BDL
JUN	.022	BDL	.024	.014
JUL	.032	.004 <T	.	.
AUG	.034	.002 <T	.024	.016
SEP	.048	.008 <T	.014	.008 <T
OCT	.042	.004 <T	.020	.014
NOV	BDL	.014	.024	.020
DEC	.006 <T	.004 <T	.012	.008 <T
NITRITE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = 1 (A1)
JAN	.002 <T	.001 <T	.	.
FEB	.002 <T	.001 <T	.002 <T	.001 <T
MAR	.002 <T	.001 <T	.001 <T	.001 <T
APR	.003 <T	ILA	.002 <T	.001 <T
MAY	.003 <T	.001 <T	.002 <T	.002 <T
JUN	.012	.014	.008	.016
JUL	.002 <T	.002 <T	.	.
AUG	.002 <T	.001 <T	.001 <T	.003 <T
SEP	.001 <T	BDL	.002 <T	.001 <T
OCT	.002 <T	.001 <T	.002 <T	.002 <T
NOV	.006	.010	.015	.010
DEC	.002 <T	.001 <T	.001 <T	.001 <T
TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)
JAN	.125	.130	.	.
FEB	.130	.145	.145	.145
MAR	.160	.170	.160	.175
APR	.125	ILA	.135	.130
MAY	.040	.025	.055	.040
JUN	.020 <T	.025	.020 <T	.025
JUL	.020 <T	.025	.	.
AUG	BDL	BDL	BDL	BDL
SEP	.015 <T	.015 <T	.015 <T	.015 <T
OCT	.010 <T	.005 <T	.005 <T	.005 <T
NOV	.005 <T	.020 <T	.015 <T	.015 <T
DEC	.040	.040	.040	.040
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A
JAN	.470	.250	.	.
FEB	.440	.250	.250	.240
MAR	.440	.250	.250	.260
APR	.470	.240	.230	.240
MAY	.530	.210	.220	.220
JUN	.470	.230	.250	.280
JUL	.450	.260	.	.
AUG	.440	.200	.190	.210
SEP	.480	.250	.250	.260
OCT	.500	.260	.260	.240
NOV	.410	.200	.190	.200
DEC	.390	.210	.200	.210

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
PH (DIMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)	
JAN	7.940	7.940	.	.	.
FEB	7.790	7.850	7.520	7.490	.
MAR	7.890	7.870	7.580	7.690	.
APR	7.840	ILA	7.600	7.800	.
MAY	7.750	7.580	7.710	7.690	.
JUN	7.950	7.940	7.860	7.920	.
JUL	7.940	7.770	.	.	.
AUG	7.690	7.740	7.530	7.550	.
SEP	7.910	7.770	7.540	7.660	.
OCT	7.940	7.720	7.730	7.770	.
NOV	7.960	7.920	7.650	7.690	.
DEC	7.950	7.720	7.570	7.690	.
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A	
JAN	BDL	BDL	.	.	.
FEB	.000 <T	BDL	.	.	.
MAR	.001 <T	BDL	.	.	.
APR	.001 <T	ILA	.	.	.
MAY	.003	BDL	.	.	.
JUN	.000 <T	BDL	.	.	.
JUL	.002 <T	.001 <T	.	.	.
AUG	.002	BDL	.	.	.
SEP	.003	.001 <T	.	.	.
OCT	.007	.001 <T	.	.	.
NOV	.001 <T	BDL	.	.	.
DEC	.001 <T	.000 <T	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)	
JAN	.012	BDL	.	.	.
FEB	.014	.004 <T	.	.	.
MAR	.016	.002 <T	.	.	.
APR	.016	BDL	.	.	.
MAY	.018	.002 <T	.	.	.
JUN	.015	.003 <T	.	.	.
JUL	.015	.004 <T	.	.	.
AUG	.020	.003 <T	.	.	.
SEP	.029	.007 <T	.	.	.
OCT	.035	.018	.	.	.
NOV	.015	BDL	.	.	.
DEC	.014	.003 <T	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)	
JAN	5.820	29.700	.	.	.
FEB	4.840	28.940	28.820	28.820	.
MAR	4.090	26.440	26.050	27.440	.
APR	4.950	ILA	27.980	28.530	.
MAY	4.600	28.380	26.910	27.840	.
JUN	5.030	25.440	25.500	25.610	.
JUL	4.410	24.520	.	.	.
AUG	4.150	24.520	25.320	25.330	.
SEP	4.410	23.800	23.880	24.360	.
OCT	5.620	23.690	24.860	24.620	.
NOV	4.760	24.780	25.260	24.620	.
DEC	4.870	27.280	26.810	27.010	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)
JAN	2.700	2.300	.	.
FEB	1.600	1.300	.610	.670
MAR	1.850	.450	.390	.390
APR	1.780	.490	.570	.360
MAY	2.100	.390	.390	.320
JUN	1.600	.210	.280	.240
JUL	1.100	3.700	.	.
AUG	1.300	.420	1.400	.450
SEP	1.900	.240 <T	1.300	.400
OCT	1.720	.300	.350	.200 <T
NOV	1.880	.380	.560	.320
DEC	1.320	1.350	.830	.360

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
METALS				
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
JAN	15.000	37.000	.	.
FEB	35.000	39.000	7.100	37.000
MAR	25.000	38.000	19.000	36.000
APR	36.000	39.000	13.000	37.000
MAY	33.000	29.000	28.000	27.000
JUN	18.000	24.000	26.000	22.000
JUL	15.000	28.000	.	.
AUG	19.000	29.000	23.000	25.000
SEP	22.000	27.000	11.000	21.000
OCT	25.000	31.000	8.300	23.000
NOV	16.000	42.000	13.000	31.000
DEC	14.000	34.000	12.000	33.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
JAN	.730 <T	.330 <T	.	.
FEB	.840 <T	.240 <T	.230 <T	.430 <T
MAR	.720 <T	.250 <T	.280 <T	.250 <T
APR	.520 <T	.240 <T	.170 <T	.270 <T
MAY	.670 <T	.280 <T	BDL	BDL
JUN	.440 <T	.110 <T	.130 <T	BDL
JUL	.690 <T	.230 <T	.	.
AUG	.900 <T	.540 <T	.570 <T	.250 <T
SEP	.920 <T	.310 <T	.420 <T	.510 <T
OCT	.930 <T	.360 <T	.400 <T	.380 <T
NOV	.830 <T	.250 <T	.250 <T	.290 <T
DEC	.670 <T	.280 <T	.230 <T	.220 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
JAN	12.000	11.000	.	.
FEB	13.000	12.000	13.000	12.000
MAR	13.000	12.000	14.000	12.000
APR	14.000	13.000	15.000	13.000
MAY	13.000	12.000	12.000	12.000
JUN	13.000	12.000	15.000	12.000
JUL	12.000	12.000	.	.
AUG	12.000	12.000	12.000	12.000
SEP	12.000	12.000	13.000	12.000
OCT	11.000	10.000	12.000	11.000
NOV	12.000	11.000	12.000	11.000
DEC	12.000	12.000	12.000	11.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)
JAN	9.900 <T	9.400 <T	.	.
FEB	9.700 <T	9.000 <T	9.700 <T	15.000 <T
MAR	8.900 <T	8.700 <T	9.100 <T	8.600 <T
APR	13.000 <T	19.000 <T	18.000 <T	16.000 <T
MAY	24.000	27.000	25.000	23.000
JUN	12.000 <T	12.000 <T	14.000 <T	11.000 <T
JUL	11.000 <T	11.000 <T	.	.
AUG	14.000 <T	14.000 <T	16.000 <T	16.000 <T
SEP	18.000 <T	10.000 <T	21.000	20.000 <T
OCT	8.100 <T	5.800 <T	7.800 <T	8.600 <T
NOV	9.300 <T	9.400 <T	9.500 <T	9.300 <T
DEC	13.000 <T	10.000 <T	9.800 <T	13.000 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CADMIUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 5 (A1)**
JAN	BDL	BDL	.	.
FEB	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	.120 <T
APR	BDL	BDL	.070 <T	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	BDL	BDL	.	.
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
COBALT (UG/L)			**DET'N LIMIT = 0.02**	**GUIDELINE = N/A**
JAN	.100 <T	.100 <T	.	.
FEB	.170 <T	.080 <T	.150 <T	.040 <T
MAR	.080 <T	.080 <T	.110 <T	.070 <T
APR	.100 <T	.080 <T	.070 <T	.090 <T
MAY	.040 <T	.040 <T	BDL	.040 <T
JUN	.080 <T	.110 <T	.140 <T	.110 <T
JUL	.140 <T	.110 <T	.	.
AUG	.060 <T	.050 <T	.040 <T	.050 <T
SEP	.110 <T	.100 <T	.120 <T	.070 <T
OCT	.070 <T	.070 <T	.150 <T	.070 <T
NOV	.100 <T	.080 <T	.130 <T	.080 <T
DEC	.120 <T	.120 <T	.100 <T	.090 <T
CHROMIUM (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = 50 (A1)**
JAN	BDL	BDL	.	.
FEB	BDL	BDL	BDL	1.200 <T
MAR	BDL	BDL	BDL	BDL
APR	BDL	.620 <T	.520 <T	BDL
MAY	1.200 <T	1.400 <T	1.300 <T	1.200 <T
JUN	1.300 <T	1.100 <T	1.400 <T	.890 <T
JUL	BDL	BDL	.	.
AUG	.760 <T	.720 <T	.880 <T	.870 <T
SEP	2.900 <T	BDL	3.600 <T	3.600 <T
OCT	1.100 <T	BDL	1.000 <T	1.300 <T
NOV	.570 <T	.530 <T	.530 <T	.570 <T
DEC	1.000 <T	BDL	BDL	1.100 <T
COPPER (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = 1000 (A3)**
JAN	2.000 <T	.900 <T	.	.
FEB	2.300 <T	1.400 <T	3200.000	110.000
MAR	1.100 <T	1.300 <T	1600.000	110.000
APR	1.700 <T	2.800 <T	3658.000	120.000
MAY	.840 <T	.910 <T	180.000	95.000
JUN	1.400 <T	1.700 <T	800.000	150.000
JUL	1.400 <T	1.800 <T	.	.
AUG	1.300 <T	3.400 <T	710.000	210.000
SEP	1.100 <T	5.800	1700.000	390.000
OCT	1.100 <T	1.200 <T	1800.000	77.000
NOV	1.100 <T	1.200 <T	1700.000	180.000
DEC	1.300 <T	2.300 <T	1700.000	63.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)
JAN	30.000 <T	29.000 <T	.	.
FEB	28.000 <T	47.000 <T	11.000 <T	15.000 <T
MAR	37.000 <T	20.000 <T	14.000 <T	19.000 <T
APR	54.000 <T	33.000 <T	10.000 <T	11.000 <T
MAY	33.000 <T	23.000 <T	25.000 <T	23.000 <T
JUN	27.000 <T	14.000 <T	14.000 <T	23.000 <T
JUL	25.000 <T	48.000 <T	.	.
AUG	33.000 <T	19.000 <T	23.000 <T	29.000 <T
SEP	56.000 <T	20.000 <T	24.000 <T	29.000 <T
OCT	37.000 <T	12.000 <T	19.000 <T	26.000 <T
NOV	22.000 <T	9.500 <T	14.000 <T	22.000 <T
DEC	26.000 <T	25.000 <T	17.000 <T	21.000 <T
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)
JAN	.050 <T	.080 <T	.	.
FEB	.070 <T	.060 <T	.	.
MAR	BDL	BDL	.	.
APR	BDL	BDL	.	.
MAY	BDL	BDL	.	.
JUN	.040 <T	BDL	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	.030 <T	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)
JAN	4.600	1.500	.	.
FEB	4.500	1.700	1.200	1.100
MAR	4.900	2.000	1.700	1.400
APR	6.900	2.600	1.700	1.300
MAY	6.300	1.100	1.100	.990
JUN	9.000	2.800	1.800	1.700
JUL	12.000	3.600	.	.
AUG	13.000	2.200	1.000	1.300
SEP	11.000	2.100	1.100	1.400
OCT	6.800	1.000	1.900	.900
NOV	6.900	.990	.750	.890
DEC	6.600	1.200	.860	.560
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
JAN	.240 <T	.260 <T	.	.
FEB	.190 <T	.260 <T	.230 <T	.280 <T
MAR	.200 <T	.210 <T	.180 <T	.200 <T
APR	.290 <T	.140 <T	.160 <T	.190 <T
MAY	.210 <T	.200 <T	.190 <T	.260 <T
JUN	.110 <T	.210 <T	.210 <T	.230 <T
JUL	.090 <T	.180 <T	.	.
AUG	.140 <T	.220 <T	.220 <T	.270 <T
SEP	.200 <T	.240 <T	.260 <T	.300 <T
OCT	.180 <T	.240 <T	.210 <T	.220 <T
NOV	.170 <T	.230 <T	.230 <T	.240 <T
DEC	.140 <T	.220 <T	.190 <T	.210 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)	
JAN	.760 <T	.760 <T	.	.	.
FEB	.320 <T	.590 <T	9.300	.360 <T	.
MAR	.330 <T	.510 <T	2.000 <T	.470 <T	.
APR	BDL	.490 <T	.810 <T	.480 <T	.
MAY	.420 <T	.270 <T	.670 <T	.750 <T	.
JUN	.260 <T	.250 <T	1.600 <T	.510 <T	.
JUL	.240 <T	.400 <T	.	.	.
AUG	.410 <T	.480 <T	1.400 <T	1.000 <T	.
SEP	.400 <T	.690 <T	7.900	2.200	.
OCT	.840 <T	.830 <T	5.600	.800 <T	.
NOV	.580 <T	.750 <T	2.200	.730 <T	.
DEC	BDL	.360 <T	2.100	BDL	.
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)	
JAN	.260 <T	.120 <T	.	.	.
FEB	.580	.550	49.000	2.300	.
MAR	.140 <T	.120 <T	13.000	19.000	.
APR	.310 <T	1.500	78.000	1.400	.
MAY	.210 <T	.440 <T	2.100	1.300	.
JUN	.210 <T	.350 <T	5.400	1.700	.
JUL	.200 <T	1.000	.	.	.
AUG	.350 <T	1.100	7.700	2.900	.
SEP	.220 <T	2.300	19.000	3.800	.
OCT	.130 <T	.380 <T	44.000	1.100	.
NOV	.290 <T	.440 <T	12.000	1.800	.
DEC	BDL	.720	38.000	1.400	.
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)	
JAN	.240 <T	.280 <T	.	.	.
FEB	.760	.420 <T	.530	.500 <T	.
MAR	.340 <T	.290 <T	.320 <T	.390 <T	.
APR	.360 <T	.560	.620	.480 <T	.
MAY	.530	.390 <T	.590	.540	.
JUN	.450 <T	.540	.660	.630	.
JUL	.410 <T	.290 <T	.	.	.
AUG	.400 <T	.290 <T	.460 <T	.460 <T	.
SEP	.480 <T	.440 <T	.510	.450 <T	.
OCT	.410 <T	.420 <T	.430 <T	.350 <T	.
NOV	.430 <T	.420 <T	.540	.500 <T	.
DEC	.520	.420 <T	.510	.540	.
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)	
JAN	BDL	BDL	.	.	.
FEB	BDL	BCL	BDL	BDL	.
MAR	BDL	BDL	BDL	BDL	.
APR	1.400 <T	BDL	BDL	BDL	.
MAY	BDL	BDL	BDL	BDL	.
JUN	BDL	BDL	BDL	BDL	.
JUL	BDL	BDL	.	.	.
AUG	BDL	BDL	1.500 <T	BDL	.
SEP	BDL	BDL	BDL	BDL	.
OCT	BDL	BDL	BDL	BDL	.
NOV	BDL	BDL	BDL	BDL	.
DEC	BDL	BDL	BDL	BDL	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
STRONTIUM (UG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = N/A**
JAN	30.000	30.000		
FEB	29.000	28.000	29.000	29.000
MAR	33.000	33.000	33.000	33.000
APR	29.000	28.000	30.000	29.000
MAY	31.000	31.000	28.000	30.000
JUN	29.000	29.000	31.000	29.000
JUL	28.000	28.000		
AUG	28.000	26.000	28.000	27.000
SEP	29.000	28.000	29.000	28.000
OCT	28.000	26.000	29.000	28.000
NOV	29.000	29.000	29.000	29.000
DEC	30.000	30.000	31.000	28.000
TITANIUM (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = N/A**
JAN	3.700 <T	2.700 <T		
FEB	3.800 <T	3.100 <T	3.300 <T	2.900 <T
MAR	4.800 <T	4.000 <T	5.400	5.500
APR	6.100	5.300	5.300	5.300
MAY	2.900 <T	2.100 <T	3.300 <T	4.700 <T
JUN	7.200	6.500	7.600	7.000
JUL	4.200 <T	3.600 <T		
AUG	7.000	7.000	6.500	6.800
SEP	3.200 <T	2.300 <T	2.100 <T	2.100 <T
OCT	3.200 <T	2.300 <T	2.200 <T	2.200 <T
NOV	3.100 <T	2.500 <T	2.600 <T	2.600 <T
DEC	2.500 <T	2.200 <T	2.000 <T	2.000 <T
URANIUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 100 (A1)**
JAN	.090 <T	BDL		
FEB	BDL	BDL	BDL	BDL
MAR	.060 <T	BDL	BDL	BDL
APR	.070 <T	BDL	BDL	BDL
MAY	.070 <T	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	.070 <T	BDL		
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL
VANADIUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = N/A**
JAN	.380 <T	.180 <T		
FEB	.420 <T	.180 <T	.100 <T	.200 <T
MAR	.450 <T	.220 <T	.170 <T	.230 <T
APR	.470 <T	.200 <T	.110 <T	.190 <T
MAY	.350 <T	.140 <T	.120 <T	.110 <T
JUN	.380 <T	.220 <T	.250 <T	.210 <T
JUL	.370 <T	.250 <T		
AUG	.450 <T	.280 <T	.270 <T	.240 <T
SEP	.510	.280 <T	.170 <T	.270 <T
OCT	.400 <T	.230 <T	.120 <T	.160 <T
NOV	.390 <T	.190 <T	.100 <T	.150 <T
DEC	.220 <T	BDL	BDL	.060 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
JAN	1.500 <T	8.100	.	.
FEB	1.400 <T	7.900	210.000	4.400
MAR	3.900	7.700	36.000	2.700
APR	11.000	18.000	19.000	4.400
MAY	4.400	9.000	6.900	3.600
JUN	6.700	8.300	9.500	3.700
JUL	6.300	15.000	.	.
AUG	7.000	14.000	14.000	6.300
SEP	4.900	24.000	39.000	6.200
OCT	6.100	5.800	140.000	3.700
NOV	20.000	8.100	26.000	3.600
DEC	5.000	10.000	95.000	2.900

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
		RAW	TREATED	SITE 1	
				STANDING	FREE FLOW
CHLOROAROMATICS					
HEXACHLOROCYCLOPENTADIENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 206000 (D4)
OCT	INR	350.000	.	90.000	.
NOV	BDL	BDL	.	BDL	.
DEC	BDL	BDL	.	BDL	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
		STANDING	FREE FLOW	
PESTICIDES & PCB				
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 700 (G)	
JAN	BDL	BDL	.	.
FEB	BDL	BDL	.	BDL
MAR	BDL	BDL	.	BDL
APR	IIS	BDL	.	BDL
MAY	1.000 <T	BDL	.	1.000 <T
JUN	IIS	BDL	.	BDL
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	INR	1.000 <T	.	1.000 <T
NOV	BDL	1.000 <T	.	1.000 <T
DEC	BDL	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .200	GUIDELINE = 2 (A4)	
JAN	1.000	.800 <T	.	.	.
FEB	.400 <T	.600 <T	.	.	.
MAR	.800 <T	1.600	.	.	.
APR	BDL	BDL	.	.	.
MAY	BDL	.600 <T	.	.	.
JUN	BDL	.800 <T	.	.	.
JUL	BDL	.400 <T	.	.	.
AUG	BDL	BDL	.	.	.
SEP	.600 <T	.600 <T	.	.	.
OCT	IPR	.400 <T	.	.	.
NOV	1.000	1.200	.	.	.
DEC	.800 <T	.800 <T	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VOLATILES				
BENZENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)	
JAN	BDL	BDL	.	.
FEB	.100 <T	.100 <T	.050 <T	.
MAR	BDL	.150 <T	BDL	.
APR	BDL	.100 <T	BDL	.
MAY	BDL	.350 <T	.250 <T	.
JUN	BDL	.100 <T	BDL	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	BDL	.
SEP	BDL	BDL	BDL	.
OCT	BDL	BDL	BDL	.
NOV	BDL	BDL	BDL	.
DEC	IBT	BDL	BDL	.
TOLUENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)	
JAN	BDL	.050 <T	.	.
FEB	BDL	.400 <T	BDL	.
MAR	BDL	.500	BDL	.
APR	BDL	.200 <T	BDL	.
MAY	BDL	.800	.150 <T	.
JUN	BDL	.100 <T	.050 <T	.
JUL	BDL	.050 <T	.	.
AUG	BDL	BDL	BDL	.
SEP	BDL	.100 <T	.100 <T	.
OCT	BDL	.100 <T	.050 <T	.
NOV	BDL	BDL	BDL	.
DEC	IBT	BDL	BDL	.
ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)	
JAN	BDL	BDL	.	.
FEB	.100 <T	.150 <T	.100 <T	.
MAR	BDL	.200 <T	.150 <T	.
APR	.050 <T	.150 <T	.100 <T	.
MAY	BDL	.250 <T	BDL	.
JUN	BDL	.150 <T	BDL	.
JUL	BDL	.050 <T	.	.
AUG	BDL	BDL	BDL	.
SEP	BDL	.100 <T	BDL	.
OCT	BDL	.050 <T	BDL	.
NOV	BDL	.050 <T	BDL	.
DEC	IBT	.200 <T	BDL	.
M-XYLENE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)	
JAN	BDL	BDL	.	.
FEB	BDL	.200 <T	BDL	.
MAR	BDL	.300 <T	BDL	.
APR	BDL	.100 <T	BDL	.
MAY	BDL	.800 <T	BDL	.
JUN	BDL	.100 <T	BDL	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	BDL	.
SEP	BDL	BDL	BDL	.
OCT	BDL	BDL	BDL	.
NOV	BDL	BDL	BDL	.
DEC	IBT	BDL	BDL	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
O-XYLENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)	
JAN	BDL	BDL	.	.
FEB	BDL	.100 <T	BDL	.
MAR	BDL	.150 <T	BDL	.
APR	BDL	.050 <T	BDL	.
MAY	BDL	.450 <T	BDL	.
JUN	BDL	.050 <T	BDL	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	BDL	.
SEP	BDL	BDL	BDL	.
OCT	BDL	BDL	BDL	.
NOV	BDL	BDL	BDL	.
DEC	IBT	BDL	BDL	.
STYRENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)	
JAN	BDL	.100 <T	.	.
FEB	.150 <T	.200 <T	.200 <T	.
MAR	BDL	.200 <T	.200 <T	.
APR	.050 <T	.200 <T	.150 <T	.
MAY	BDL	.150 <T	BDL	.
JUN	BDL	.250 <T	BDL	.
JUL	BDL	.050 <T	.	.
AUG	BDL	BDL	BDL	.
SEP	BDL	BDL	BDL	.
OCT	BDL	BDL	BDL	.
NOV	BDL	.050 <T	BDL	.
DEC	IBT	.250 <T	BDL	.
CHLOROFORM (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)	
JAN	3.100	73.000	.	.
FEB	3.200	74.100	77.600	.
MAR	7.700	78.300	81.500	.
APR	4.400	64.800	71.500	.
MAY	8.900	95.300	84.500	.
JUN	25.200	161.400	139.200	.
JUL	7.700	170.000	.	.
AUG	25.500	164.800	134.700	.
SEP	4.700	138.100	113.500	.
OCT	17.600	137.100	112.700	.
NOV	5.100	98.300	82.400	.
DEC	IBT	78.300	74.100	.
111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)	
JAN	BDL	BDL	.	.
FEB	BDL	BDL	BDL	.
MAR	BDL	BDL	BDL	.
APR	.020 <T	BDL	BDL	.
MAY	1.000	.520	.640	.
JUN	BDL	BDL	BDL	.
JUL	BDL	BDL	.	.
AUG	.020 <T	BDL	BDL	.
SEP	.020 <T	BDL	BDL	.
OCT	BDL	BDL	BDL	.
NOV	BDL	BDL	BDL	.
DEC	IBT	.040 <T	BDL	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM KENORA WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)
JAN	.200 <T	3.050	.	.
FEB	.250 <T	2.550	.	2.800
MAR	.350 <T	2.650	.	2.800
APR	.200 <T	2.150	.	2.600
MAY	.300 <T	3.100	.	2.800
JUN	.850	4.450	.	3.950
JUL	.250 <T	4.150	.	.
AUG	.900	4.600	.	4.000
SEP	.200 <T	4.250	.	3.700
OCT	.700	4.300	.	3.550
NOV	.300 <T	3.250	.	2.900
DEC	IBT	2.950	.	2.750
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)
JAN	3.350 <T	76.050	.	.
FEB	3.400 <T	76.600	.	80.350
MAR	8.050	80.950	.	84.300
APR	4.600 <T	66.950	.	74.100
MAY	9.200	98.400	.	87.300
JUN	26.050	165.850	.	143.150
JUL	7.950	174.500	.	.
AUG	26.400	169.450	.	138.700
SEP	4.900 <T	142.350	.	117.200
OCT	18.300	141.400	.	116.200
NOV	5.350	101.500	.	85.250
DEC	IBT	81.300	.	76.900

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DIMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DIMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DIMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAN	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) **(OPOPUP)**	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics **(OWOC) (OAPAHX)**	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.